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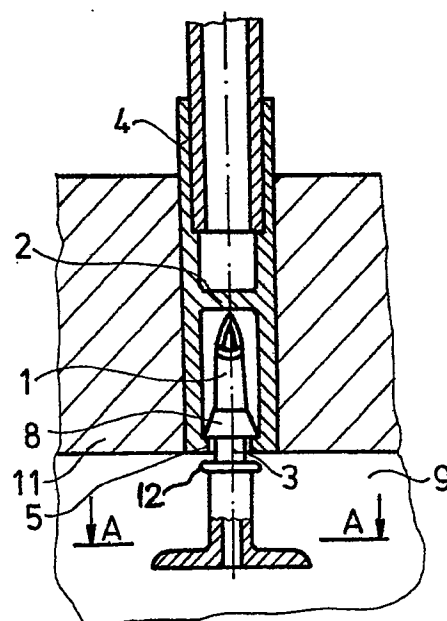
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⑤④ **Transfer device for the interconnection of single-use synthetic bags and/or systems for therapeutic or other purposes.**

⑤⑦ A transfer device for the interconnection of multi-part, single-use, synthetic bags (9, 10) and/or systems having independent compartments for therapeutic and other purposes includes a transfer tube (4) extending through the wall (11) of the synthetic bag which is sealed by a closing diaphragm (2) in the transfer tube (4). A piercing tube (1) is arranged in the interior of the synthetic bag and extends into the transfer tube (4). An internal flange (5) is formed on the wall of the transfer tube (4) at its end adjacent the interior of the synthetic bag (9). A groove (3) on the stem of the piercing tube (1) receives the internal flange (5) in the closed position of the bag (9). The piercing tube (1) terminates in a plate (6) manually engageable from the outside to push the tip of the piercing tube (1) through the diaphragm (2), whereby to allow the contents of the bag (9) to be discharged via the tubes (1) and (4).



-1-

TRANSFER DEVICE FOR THE INTERCONNECTION OF SINGLE-USE  
SYNTHETIC BAGS AND/OR SYSTEMS FOR THERAPEUTIC OR  
OTHER PURPOSES

The invention relates to a transfer device whereby single-use synthetic bags and/or systems provided with independent compartments for therapeutic or other purposes can be interconnected by passing a tube through  
5 a built-in diaphragm.

As is known, multi-part synthetic bags are used in medical practice, particularly in case of blood-taking, blood-processing and for the production of blood preparations. These are subjected to autoclave  
10 with the appropriate solutions before use. The blood-taking bag contains a blood preserving solution and the supplementary, so-called transfer, bags contain a resuspension solution. The blood preparations can be produced in the multi-part bags by ensuring the transfer  
15 between the bags - containing occasionally different solutions and separated by a diaphragm from each other - with the aid of suitable devices.

Two types of these devices are known; one of them is the ball or plug-type device, e.g.  
20 described in US-A-3 921 634. An external aid means is required for the opening of these devices.

The other known type is the needle-type device described e.g. in DE-A-2 026 086 and 2 331 687. The needle-type devices produced so far are labour-  
25 intensive and owing to the multiple use of the rubber hoses the process of puncture is not visible.

-2-

The invention aims to eliminate or reduce the shortcomings of the existing devices, lower their production costs, facilitate assembly, obviate the need for an auxiliary device during  
5 manipulation, easy passage of the medium transferred and visibility.

The invention is based on the recognition that the operation of such transfer devices becomes reliable and the position is always perceptible  
10 by providing the elements of the device with suitable locking, and that by a suitable formation of the piercing tube the use of auxiliary means is eliminated.

The invention thus relates to a transfer device for the interconnection of multi-part synthetic  
15 bags and/or systems having independent compartments, used once only for therapeutic or other purposes, including a transfer tube extending through the wall of the synthetic bag, a sealing diaphragm arranged within the tube, a piercing tube extending from the interior  
20 of the synthetic bag, an internal flange on the wall of the transfer tube between its end at the internal space of the synthetic bag and the diaphragm, and a groove arranged on the piercing tube into which the internal flange fits in the closed position.

25 In a preferred construction of the transfer device according to the invention, a pressure plate is arranged on the piercing tube at its end at the internal space of the synthetic bag.

-3-

In another preferred construction of the transfer device according to the invention an opening, preferably a slot, is arranged on the pressure plate at the stem of the piercing tube.

5 A preferred embodiment of the invention is described in detail with the aid of the accompanying drawing, in which:

Figure 1 is a schematic elevation showing the two synthetic bags, each having independent 10 compartments, by means of a transfer device according to the invention,

Figures 2 and 3 are respectively longitudinal sections of the transfer device on an enlarged scale in the open and closed positions, and

15 Figure 4 is a cross-section of the piercing tube, taken on the line A-A of Figure 2.

The synthetic bags 9 and 10 shown in Figure 1 are interconnected by a tube. A transfer device according to the invention is arranged in the 20 wall of the synthetic bag 9.

The transfer device is shown in detail in Figure 2. It includes a transfer tube 4 which is welded into the wall 11 of the synthetic bag 9.

The bag 9 is closed with a diaphragm 2 at approximately 25 the middle part of the tube 4 which has an internal flange 5 formed at its inner end, i.e. the end adjacent the interior of the synthetic bag.

-4-

The transfer tube 4, the diaphragm 2 and flange 5 are produced as a one-piece, soft synthetic material, by injection moulding.

A sharp-tipped piercing tube 1 is arranged in that part of the transfer tube 4 which is adjacent the interior of the synthetic bag 9. The piercing tube 1 is produced from a hard synthetic material of suitable strength, also by injection moulding. A groove or reduced section 3 is formed on the stem of the piercing tube 1 between a collar 12 and a guide cone 8. The latter is formed adjacent the tip end of the piercing tube 1 in order to facilitate the assembly. A pressure plate 6 is arranged at the end opposite the tip of the piercing tube 1, and is provided with a slot 7 (Figure 4) passing to the stem parallel with the longitudinal axis of the piercing tube 1.

The transfer device operates in the following manner.

In the closed position the internal flange 5 of the transfer tube 4 engages in the groove 3 of the piercing tube 1. In this position, the tip of the piercing tube 1 is spaced from the diaphragm 2 which thus closes the transfer tube 4. To open the bag 9, the piercing tube 1 is pushed towards the diaphragm 2 by compressing the soft wall of the synthetic bag 9 with the aid of the pressure plate 6. This causes the internal flange 5 to snap out of the groove 3 and the tip of the piercing tube 1 can easily be passed through the

-5-

diaphragm 2 until the pressure plate 6 abuts the end of the transfer tube 4, Figure 3. The slot 7 in the pressure plate 6 assures a complete discharge of the contents of the synthetic bag 9.

- 5                   The thickness of the diaphragm 2 and/or the distance of the tip of the piercing tube 1 from the diaphragm in the closed position have to be selected during the design of the transfer device in accordance with the given or desired purpose.

-6-  
CLAIMS

1. A transfer device for the interconnection of multi-part single-use bags (9, 10) and/or systems having independent compartments for therapeutic or other purposes, comprising a transfer tube (4) extending through the wall (11) of the synthetic bag (9), a bag-closing diaphragm (2) within the transfer tube (4) and a piercing tube (1), characterised in that an internal flange (5) is formed on the wall of the transfer tube (4) between its end adjacent the interior of the bag (9) and the diaphragm (2), and a groove (3) is provided on the stem of the piercing tube (1) into which the internal flange (5) engages in the closed position of the bag.
2. A transfer device as claimed in claim 1, characterised in that a pressure application plate (6) is arranged on the piercing tube (1) at its end adjacent the interior of the bag (9).
3. A transfer device as claimed in claim 1 or claim 2, characterised in that an opening (7) is arranged on the pressure application plate (6) along the stem of the piercing tube (1).
4. A transfer device as claimed in any preceding claim, characterised in that the said stem is provided with an abutment collar (12) to limit the free movement of the stem in the closed position.
5. A transfer device as claimed in any preceding claim, characterised in that the said tube (4), diaphragm (2) and flange (5) are integrally formed from a single piece of material that is softer than the

-7-

material of the piercing tube (1).



1/2

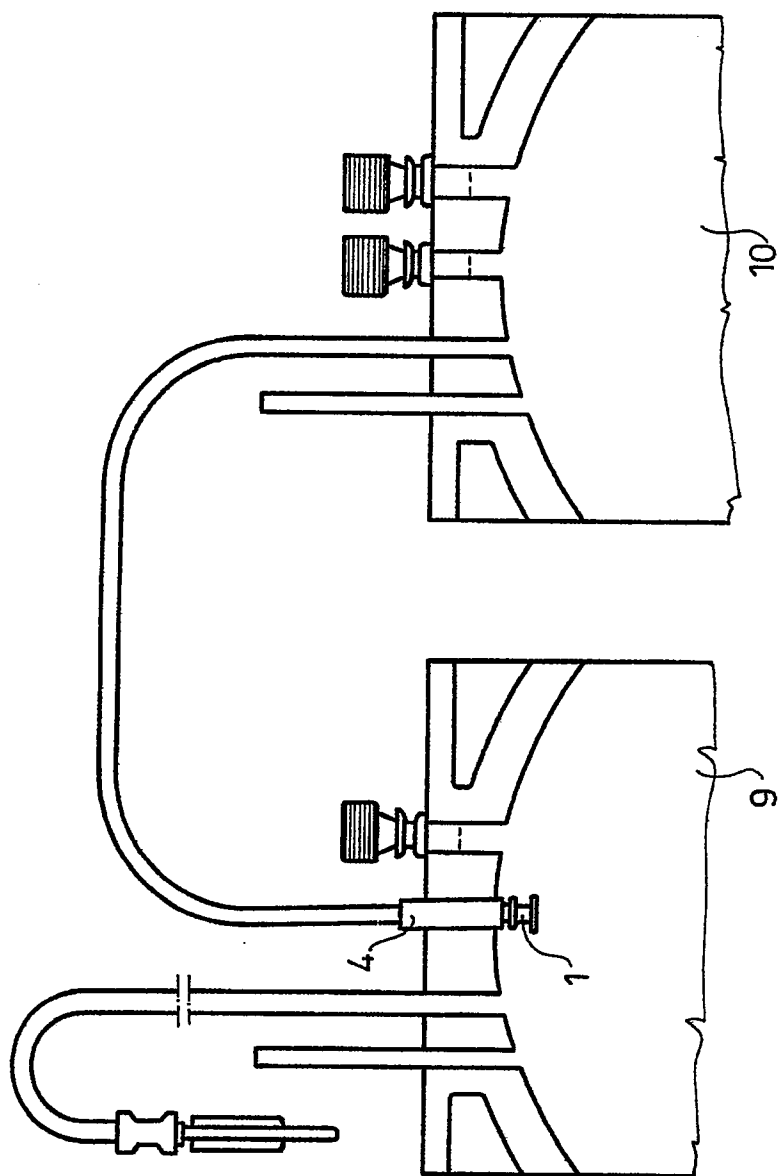


Fig.1

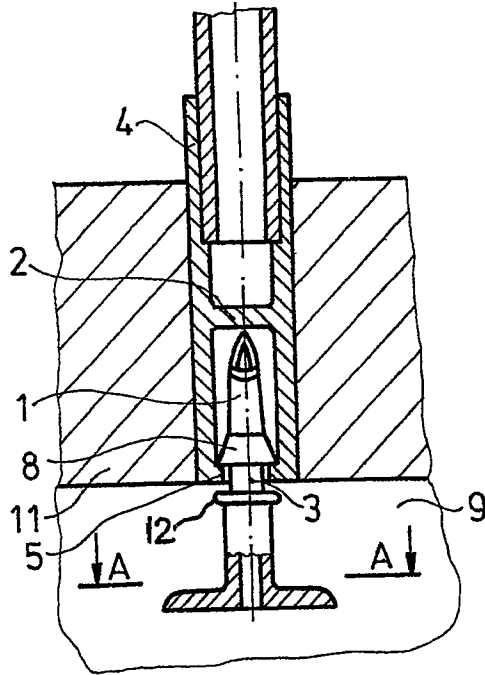


Fig. 2

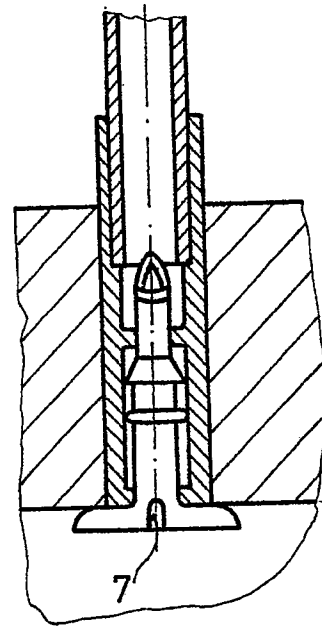


Fig. 3

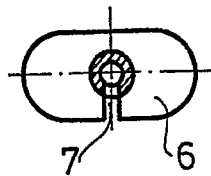


Fig. 4